Relative yields of wheat, barley and oat varieties on summerfallow and stubble

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Wheat, barley and oats are the most widely grown crops in Saskatchewan. As such it is important to have information on their relative yields, both on summerfallow and on stubble land. Provincial average yields are sometimes used but these averages are biased since 44% of the barley and 45% of the oats, but only 28% of the wheat acreages were located in northern Saskatchewan, in Crop Districts 5, 8 & 9 in 1969-72.

The objective of this work was to see whether there were significant interactions of genotypes of these species with land preparation (i.e. fallow or stubble). The experiment was continued for 4 years, growing three varieties each of wheat, barley and oats on summerfallowed land and on land which had grown Manitou wheat in the preceding year. The soil was mapped as Elstow-Aberdeen silty clay. Fertilizer was applied according to soil test recommendations each year. Average rates were 56 kg/ha of 11-48-0 on all plots with the addition of 100 kg/ha of 33-0-0 on stubble plots.

Within each species there were significant interactions between variety and land preparation (Table 1). Chinook was the lowest yielding wheat variety on both fallow and stubble, but it responded less to the summerfallow environment than did either Manitou or Selkirk. In barley, Galt outyielded Betzes on summerfallow, but their order was reversed on stubble land. Sioux outyielded Kelsey on summerfallow but not on stubble land. All of these varieties were bred in nurseries grown on summerfallowed land. The fact that their adaptation to stubble land was significantly different from their adaptation to summerfallowed land may be an indication that breeders could select for the stubble land complex of environmental conditions. This would be particularly appropriate with oats and barley since in the 1965-69 period only 31% of the oats acreage and 42% of the barley acreage in Saskatchewan were grown on summerfallow land. In contrast, 77% of the wheat acreage was on summerfallow.

Table 1. Mean yield in kg/ha of three cultivars each of wheat, barley and oats on summerfallowed and stubble land at Saskatoon, 1968-71

Cultivar	Land preparation		Stubble yield as % of fallow
	Fallow	Stubble	
Manitou	3570 a*	2450 a	69
Selkirk	3360 b	2300 b	69
Chinook	2960 c	2250 b	76
Galt	4500 a	2860 b	64
Betzes	4310 b	3000 a	70
Conquest	3930 c	2680 c	68
Sioux	4130 a	3050 a	74
Kelsey	3900 b	3080 a	79
Harmon	3640 c	2870 b	79

* Within each species and land preparation method means followed by the same letter are not significantly different at P = 0.05.

A comparison of the highest yielding varieties of the three species shows Manitou wheat to be significantly lower in yield than either Galt barley or Sioux oats, both on summerfallow and on stubble land (Table 2). Galt & Sioux yields on summerfallow were reversed on stubble land. If these varieties are representative of their species it indicates that oats are best adapted to stubble cropping.

Table 2. Mean yields of Manitou wheat, Galt barley and Sioux oats in kg/ha and as a percentage of Manitou yield on summerfallow and on stubble land.

Variety	Summerfallow		Stubble	
	Yield, kg/ha	% of Manitou	Yield, kg/ha	% of Manitou
Manitou	3570 c*	100	2450 c	100
Galt	4500 a	126	2860 b	117
Sioux	4130 b	116	3050 a	124

* Within each yield column means followed by the same letter are not significantly different at P = 0.05.

Converting these yields to bushels per acre the relative prices of Manitou, Galt and Sioux to give equal gross returns have been calculated (Table 3). The estimated final payments for 1973-74 at Saskatoon show a large advantage to growing wheat.

Table 3. Relative bushel prices of wheat, barley and oats in percentage of wheat to give equal gross returns per acre at Saskatoon, and 1973-74 estimated prices at Saskatoon.

Variety	Fallow	Stubble	Estimated final price 1973-74	
Manitou	100%	100%	1 CW $4.72	
Galt	63%	69%	1 Fd $2.39	(51%)
Sioux	49%	46%	1 Fd $1.29	(27%)